

# Flexible Conformal Metal Rubber Sensors for Entry/Landing Systems, Phase I

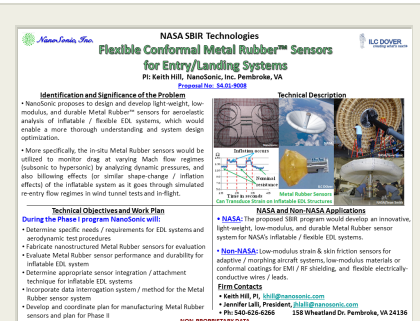
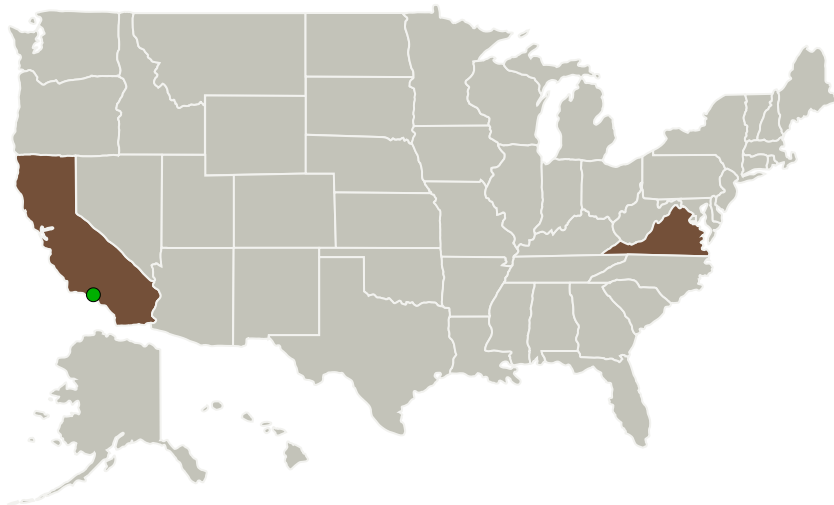
Completed Technology Project (2014 - 2014)



## Project Introduction

NanoSonic proposes to design and develop light-weight, low-modulus, and durable Metal Rubber sensors for aeroelastic analysis of inflatable/flexible entry, descent, and landing (EDL) systems, which would in effect increase the systems aerodynamic stability by contributing to optimize its design. More specifically, a network of small Metal Rubber strain sensors would provide a non-invasive mechanism to monitor loading of the inflatable deceleration and landing systems. The in-situ Metal Rubber strain sensors would be utilized to monitor drag and instability of the system at varying Mach flow regimes by analyzing dynamic structure forces and also billowing effects (or similar shape-change / inflation effects) of the inflatable system as it goes through EDL operations. The novel Metal Rubber sensors have proven the ability to monitor aerodynamic events, particularly shear and normal forces, based on their response to applied strain. These previous sensor technological advancements will be modified to develop the proposed sensor system for monitoring dynamic loading of the inflatable structure. Lightweight Metal Rubber sensor appliques can be attached onto the inflatable base material or integrated in/under the system coating matrix for in-situ non-invasive monitoring.

## Primary U.S. Work Locations and Key Partners



Flexible Conformal Metal Rubber Sensors for Entry/Landing Systems Project Image

## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

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Organizations Performing Work	Role	Type	Location
Nanosonic, Inc.	Lead Organization	Industry	Pembroke, Virginia
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

## Primary U.S. Work Locations

California	Virginia
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## Project Transitions

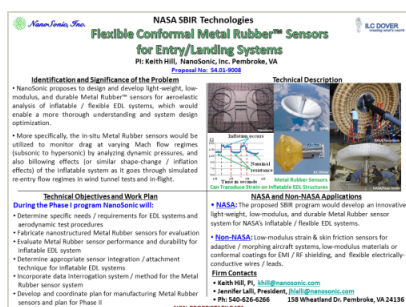
▶ **June 2014:** Project Start

✓ **December 2014:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/137558>)

## Images



## Project Image

Flexible Conformal Metal Rubber Sensors for Entry/Landing Systems  
Project Image  
(<https://techport.nasa.gov/image/127096>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Nanosonic, Inc.

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

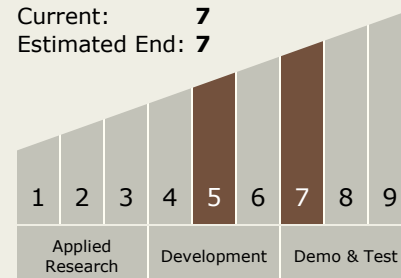
Carlos Torrez

## Principal Investigator:

Keith Hill

## Technology Maturity (TRL)

Start: 5  
Current: 7  
Estimated End: 7



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## Technology Areas

### Primary:

- TX09 Entry, Descent, and Landing
  - └ TX09.4 Vehicle Systems
    - └ TX09.4.6 Instrumentation and Health Monitoring for EDL

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System